AMENDMENTS TO THE CLAIMS

106. (Previously Presented) An article comprising:

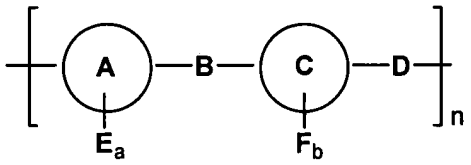
a nanoscopic pathway having a conductivity;

an insulating dielectric surrounding the nanoscopic pathway; and

a nanoscopic switch in electronic communication with the nanoscopic pathway being capable of altering the conductivity of the nanoscopic pathway,

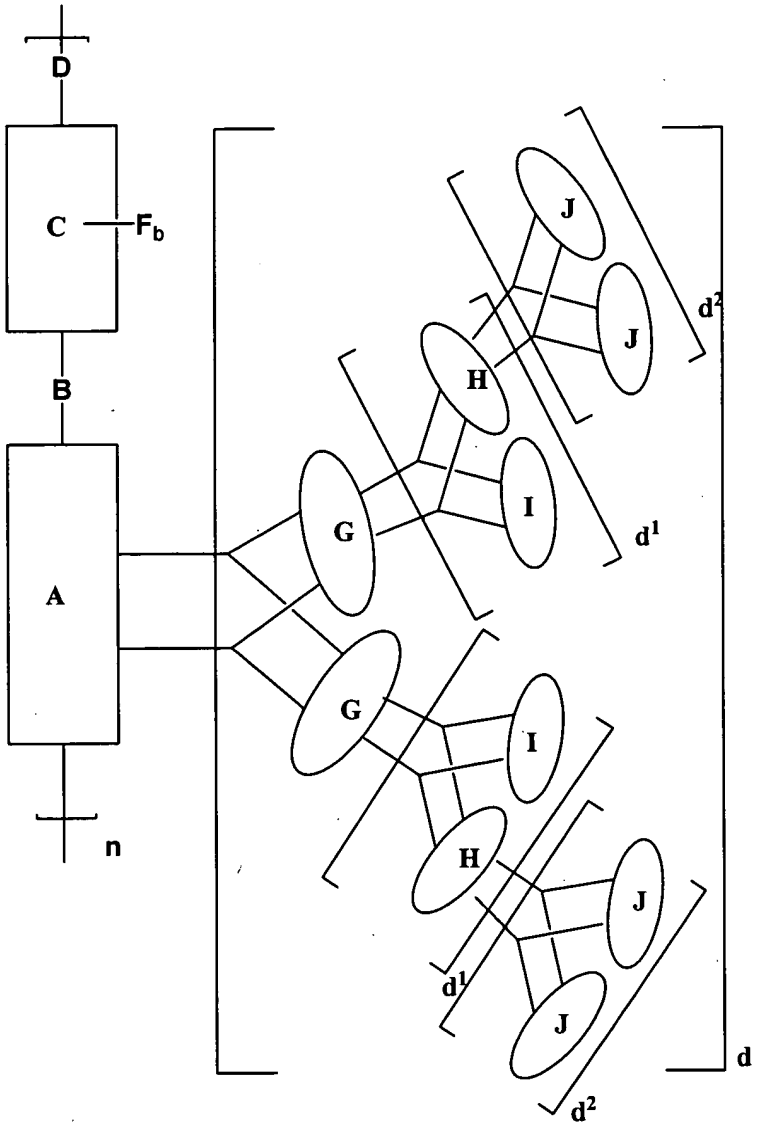
wherein the nanoscopic pathway comprises a conducting polymer,

wherein the conducting polymer has a structure comprising the formula:



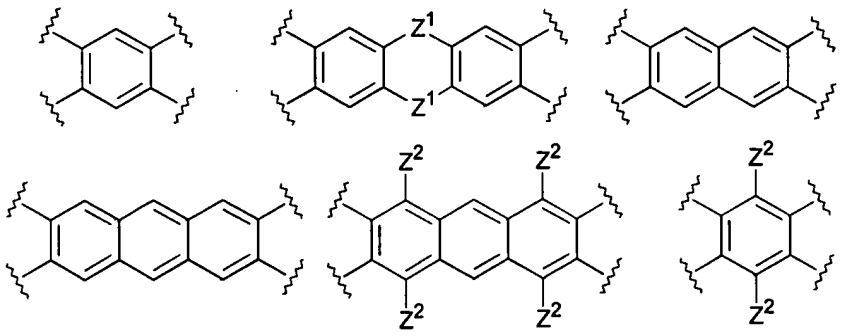
wherein A and C are aromatic groups; B and D can be a heteroatom or metal and chosen from a group of N, P, S, As, Se, or -CC-M-CC-(M=FeL_x, RuL_x, PdL_x, PtL_x, CoL_x, RhL_x, where L is neutral (phosphine, nitrogen, or π-arene based ligand) or charged (nitrogen, oxygen, or charged π-arene ligand), or are selected from the group consisting of a carbon-carbon double bond and a carbon-carbon triple bond; and any hydrogen on aromatic group A and C can be replaced by E and F respectively, wherein a and b are integers which can be the same or different and a = 0 - 4, b = 0 - 4 such that when a = 0, b is nonzero and when b = 0, a is nonzero, and at least one of E and F includes a bicyclic ring system having aromatic or non-aromatic groups optionally interrupted by O, S, NR^1 and CR^1_2 wherein R^1 is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, C_1-C_{20} alkoxy and aryl and n is less than about 10,000, and wherein, when E or F is not said bicyclic ring system, E or F is a part of aromatic group A or C.

107. (Previously Presented) The article of claim 106, wherein E_a is covalently attached to A, and the conducting polymer comprises the structure:

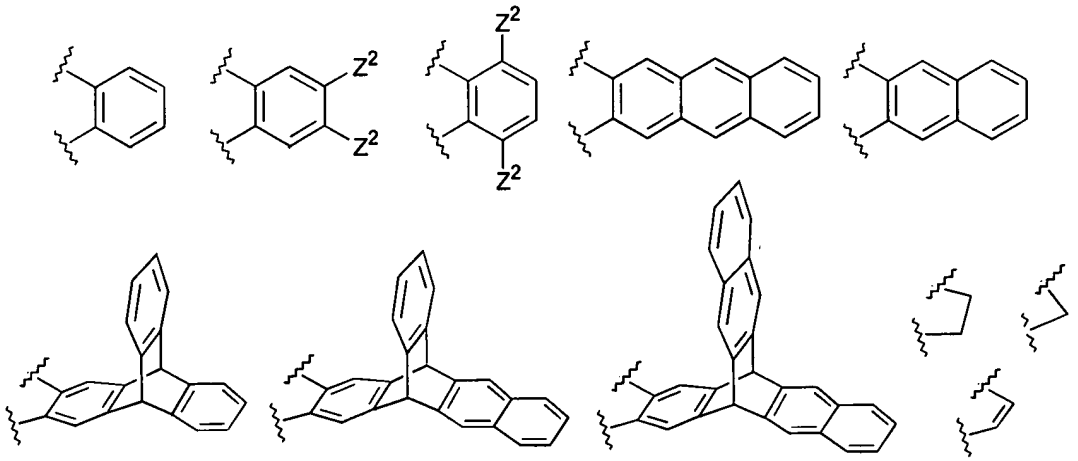


wherein G, H, I, and J are aromatic groups, d = 1, 2, and d^1 = 0, 1, such that when d^1 = 0, d^2 = 0 and when d^1 = 1, d^2 = 0, 1.

108. (Original) The article of claim 107, wherein G and H may be the same or different, and each is selected from the group consisting of:



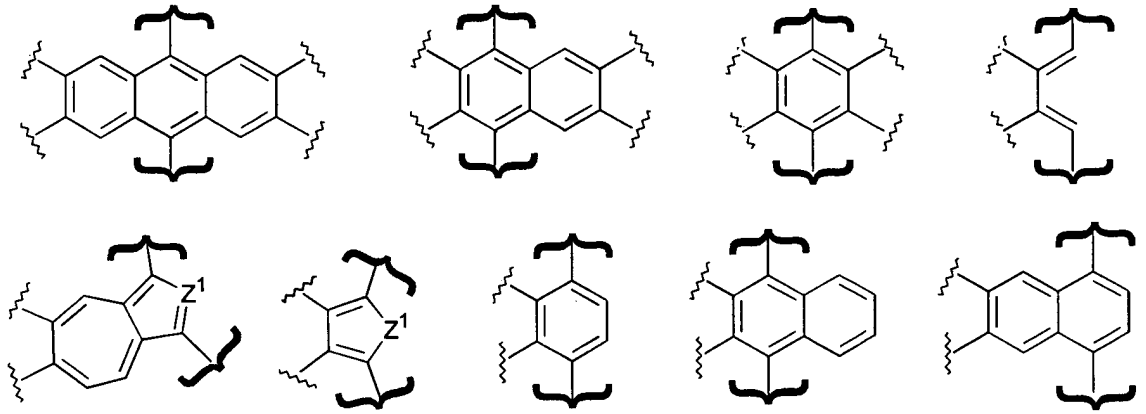
I and J may be the same or different and each is selected from the group consisting of:



wherein any hydrogen in G, H, I and J can be substituted by R^2, R^2 is selected from the group consisting of C_1-C_{20} alkyl, aryl, C_1-C_{20} alkoxy, phenoxy, C_1-C_{20} thioalkyl, thioaryl, $C(O)OR^3$, $N(R^3)(R^4)$, $C(O)N(R^3)(R^4)$, F, Cl, Br, I, NO_2, CN, acyl, carboxylate, hydroxy, R^3 and R^4 can be the same or different and each is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl, Z^1 is selected from the group consisting of O, S and NR^8 wherein R^8 is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl, and Z^2 is selected from the group consisting of F, Cl,

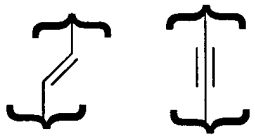
OR^3, SR^3, NR^3R^4 and $SiR^8R^3R^4$.

A is selected from the group consisting of:



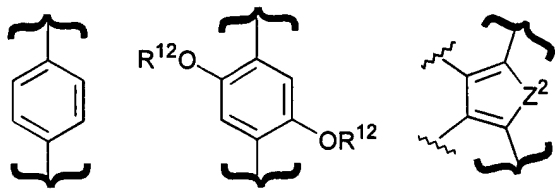
wherein any hydrogen in A can be substituted by R^5, R^5 is selected from the group consisting of C_1-C_{20} alkyl, aryl, C_1-C_{20} alkoxy, phenoxy, C_1-C_{20} thioalkyl, thioaryl, $C(O)OR^6$, $N(R^6)(R^7)$, $C(O)N(R^6)(R^7)$, F, Cl, Br, NO_2, CN, acyl, carboxylate, hydroxy; R^6 and R^7 can be the same or different and each is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl; Z^1 is selected from the group consisting of O, S and NR^8 and R^8 is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl;

B and D can be the same or different and each is selected from the group consisting of:



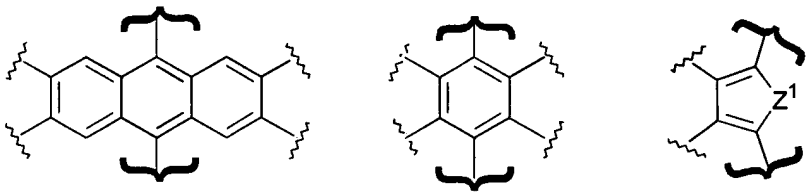
wherein any hydrogen in B and D can be substituted by R^9, R^9 is selected from the group consisting of C_1-C_{20} alkyl, aryl, C_1-C_{20} alkoxy, phenoxy, C_1-C_{20} thioalkyl, thioaryl, $C(O)OR^{10}$, $N(R^{10})(R^{11})$, $C(O)N(R^{10})(R^{11})$, F, Cl, Br, NO_2, CN, acyl, carboxylate, hydroxy, R^{10} and R^{11} can be the same or different and each is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl;

C is selected from the aromatic group consisting of:

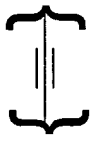


wherein R^{12} is selected from the group consisting of hydrogen, C_1-C_{20} alkyl and aryl; any hydrogen in C can be substituted by F which is represented by R^{13}, R^{13} is selected from the group consisting of C_1-C_{20} alkyl, aryl, C_1-C_{20} alkoxy, phenoxy, C_1-C_{20} thioalkyl, thioaryl, $C(O)OR^{14}$, $N(R^{14})(R^{15})$, $C(O)N(R^{14})(R^{15})$, F, Cl, Br, NO_2, CN, acyl, carboxylate, hydroxy; R^{14} and R^{15} can be the same or different and each is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl; Z^2 is selected from the group consisting of O, S and NR^{16} and R^{16} is selected from the group consisting of hydrogen, C_1-C_{20} alkyl, and aryl.

109. (Original) The article of claim 108, wherein A is selected from the group consisting of:



and both B and D are:



110-126. (Canceled)

127. (New) The article of claim 106, wherein the conducting polymer is selected from the group consisting of polyaniline, polythiophene, polypyrrole, polyphenylene, polyarylene, poly(bisthiophene phenylene), a conjugated ladder polymer, polyiptycene, polytriphenylene, poly(arylene vinylene), poly(arylene ethynylene), and organic and transition metal derivatives thereof.

128. (New) The article of claim 106, wherein a portion of the conducting polymer comprises a multi-dentate ligand.

129. (New) The article of claim 106, further comprising a metal ion bonded to a portion of the conducting polymer.

130. (New) The article of claim 106, wherein the nanoscopic pathway comprises a pathway of nanoparticles.

131. (New) The article of claim 130, wherein the nanoparticles are selected from the group consisting of nanotubes, metal clusters, semiconductor clusters, colloids and fibers.

132. (New) The article of claim 131, wherein the nanotubes are selected from the group consisting of carbon nanotubes and metallized nanotubes.

133. (New) The article of claim 131, wherein the colloids are selected from the group consisting of gold colloids and silver colloids.

134. (New) The article of claim 131, wherein the colloids comprise colloidal aggregates.

135. (New) The article of claim 131, wherein the fibers comprise graphite.

136. (New) The article of claim 106, wherein the nanoscopic pathway comprises a biological species.

137. (New) The article of claim 136, wherein the biological species is selected from the group consisting of DNA and redox-active enzymes.

138. (New) The article of claim 106, wherein the nanoscopic pathway includes a metal ion.

139. (New) The article of claim 138, wherein the metal ion is selected from the group consisting of transition metals, lanthanides and actinides.

140. (New) The article of claim 138, wherein the metal ion is selected from the group consisting of iron, copper, nickel, cobalt, ruthenium, iridium, manganese, chromium, molybdenum, vanadium, uranium.

141. (New) The article of claim 106, wherein the dielectric is selected from the group consisting of a polymer, a ceramic, a solvent, a vacuum, a gas, a liquid crystal phase, a microphase-separated block copolymer structure and combinations thereof.

142. (New) The article of claim 141, wherein the dielectric comprises a polymer.

143. (New) The article of claim 142, wherein the dielectric polymer is selected from the group consisting of polyolefins, polyesters, polyamides, polyarylenes, polyethers, polyketones, polyarylsulfides, fluoropolymers, polyacrylates, polymethacrylates, polysiloxanes, polystyrene, polyurethanes, proteins and derivatives thereof.

144. (New) The article of claim 142, wherein the dielectric polymer comprises a gel.

145. (New) The article of claim 142, wherein the dielectric polymer is attached to the conducting polymer.

146. (New) The article of claim 145, wherein the dielectric polymer is attached to the conducting polymer via a chemical bond.

147. (New) The article of claim 146, wherein the dielectric polymer is chemically bonded to the conducting polymer via a metal ion.

148. (New) The article of claim 141, wherein the ceramic is selected from the group consisting of a metal oxide and a mixed metal oxide.

149. (New) The article of claim 148, wherein the ceramic is a silicate.

150. (New) The article of claim 149, wherein the silicate is a porous silicate.

151. (New) The article of claim 106, wherein the dielectric comprises a biological species.

152. (New) The article of claim 106, wherein the dielectric includes a metal ion.

153. (New) The article of claim 106,wherein at least a portion of the nanoscopic pathway or the dielectric comprises a block co-polymer.

154. (New) The article of claim 153, wherein the block co-polymer includes blocks comprising a dielectric.

155. (New) The article of claim 154, wherein the dielectric is selected from the group consisting of polyolefins, polyesters, polyamides, polyarylenes, polyethers, polyketones, polyarylsulfides, fluoropolymers, polyacrylates, polymethacrylates, polysiloxanes, polystyrene, polyurethanes,

proteins and derivatives thereof.

156. (New) The article of claim 153, wherein the block co-polymer includes blocks comprising a conducting material.

157. (New) The article of claim 156, wherein the blocks comprising a conducting material is selected from the group consisting of a conjugated organic group and nanoparticles.

158. (New) The article of claim 157, wherein the conjugated organic group is selected from the group consisting of polyaniline, polythiophene, polypyrrole, polyphenylene, polyarylene, poly(bisthiophene phenylene), a carbon ladder polymer, polyiptycene, polytriphenylene, poly(arylene vinylene), poly(arylene ethynylene), and organic and transition metal derivatives thereof.

159. (New) The article of claim 157, wherein the nanoparticles are selected from the group consisting of nanotubes, metal clusters, colloids, and fibers.

160. (New) The article of claim 106, wherein the dielectric is non-conducting at a first electrochemical potential range and is capable of having a resistivity of less than 10^{-4} times a resistivity at a second chemical potential.

161. (New) The article of claim 106, wherein the nanoscopic switch is positioned in at least a portion of the dielectric.

162. (New) The article of claim 106, wherein the nanoscopic switch is positioned in the nanoscopic pathway.

163. (New) The article of claim 106, wherein the nanoscopic switch and the nanoscopic pathway

are capable of being redox-matched.

164. (New) The article of claim 106, wherein the nanoscopic switch is redox-active.

165. (New) The article of claim 106, wherein the nanoscopic switch is a metal ion.

166. (New) The article of claim 106, wherein the nanoscopic switch comprises a biological species selected from the group consisting of DNA and a redox-active enzyme.

167. (New) The article of claim 106, wherein the nanoscopic switch is attached to a portion of the conducting polymer.

168. (New) The article of claim 106, wherein the nanoscopic switch is capable of being activated to alter the conductivity of the nanoscopic pathway.

169. (New) The article of claim 168, wherein the nanoscopic switch is capable of altering the conductivity upon binding to an analyte.

170. (New) The article of claim 106, wherein the nanoscopic pathway is a conductor within a first electrochemical potential range.

171. (New) The article of claim 170, wherein the nanoscopic pathway is a first nanoscopic pathway, and the dielectric comprises a second nanoscopic pathway.

172. (New) The article of claim 171, wherein the second pathway is a conductor within a second electrochemical potential range.

173. (New) The article of claim 172, wherein the second electrochemical potential range is greater than the first electrochemical potential range.

174. (New) The article of claim 171, wherein the second pathway is DNA.

175. (New) The article of claim 106, wherein the nanoscopic pathway and the nanoscopic switch are redox-matched.

176. (New) The article of claim 175, wherein the nanoscopic pathway and the nanoscopic switch are redox-matched within a defined electrochemical potential range.

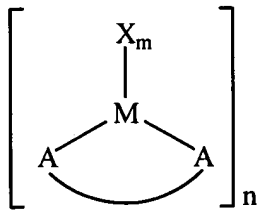
177. (New) The article of claim 138, wherein the nanoscopic pathway and metal ion are not redox-matched when the metal ion has a first ligand environment, and wherein the nanoscopic pathway and the metal ion are redox matched when the metal ion has a second ligand environment.

178. (New) A sensor comprising the article of claim 106, for detecting the presence of an analyte.

179. (New) The sensor of claim 178, wherein the nanoscopic switch is a detection site for the analyte.

180. (New) The sensor of claim 179, wherein the sensor further comprises two electrodes positioned at either end of the nanoscopic pathway.

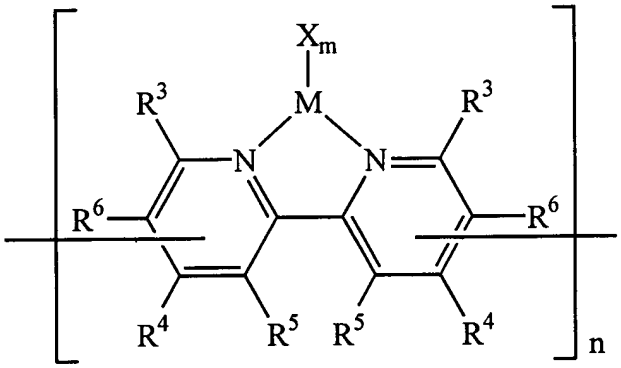
181. (New) The article of claim 106, wherein the conducting polymer has a structure comprising the formula:



wherein M is a metal ion, n denotes a number of monomer units, n being at least 3, the polymeric structure comprising linkages through at least one atom in  , and  and X are selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, alkaryl, aralkyl and optionally interrupted or terminated by N, O, P, S, heteroalkyl, heteroaryl, carbonyl, acyl, acyloxy, —CHO, —COOR1, —CO2C(R^1)$_3$, —CONC(R^1)$_2$, cyano, nitro, alkyloxy, aryloxy, hydroxyl, hydroxyalkyl, amino, alkylamino, dialkylamino, arylamino, diarylamino, — NR^1COR^2, thioalkyl, thioaryl,—SO_2R^1, —SOR^1, —SO_2OR^1, F, Cl, Br, and I; R^1 and R^2 can be the same or different, and each is selected from the group consisting of hydrogen, C1-C10 alkyl, C1-C10 heteroalkyl, aryl, heteroaryl, hydroxy, F, Cl, Br, and I, and m = 0 - 3.

182. (New) The article of claim 109, wherein the structure comprises a 1-, 2- or 3-dimensional array of n monomer units.

183. (New) The article of claim 106, wherein the conducting polymer has a structure comprising the formula:

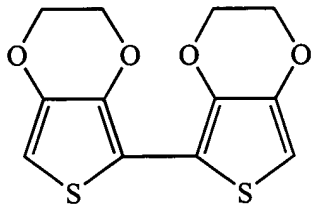


wherein M is a metal ion, n denotes a number of monomer units, n being at least 3, and the polymeric structure comprises linkages through at least one of any R^3 - R^6 units or X and R^3 - R^6 can be the same or different, and each is selected from the group consisting of hydrogen,C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, carbonyl, acyl, acyloxy, —CHO, —$COOR^1$,

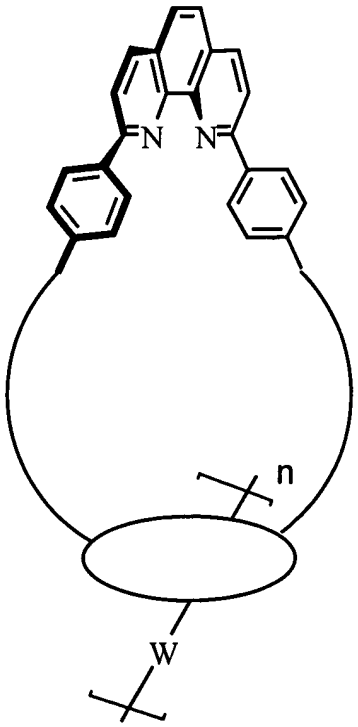
—$CO_2C(R^1)_3$, —$CONC(R^1)_2$, cyano, nitro, hydroxy, hydroxyalkyl, amino, alkylamino, dialkylamino, arylamino, diarylamino, — NR^1COR^2, thioalkyl, thioaryl,—SO_2R^1, —SOR^1, —SO_2OR^1, F, Cl, Br, I, or where possible, any two R groups combining to form a ring structure; R^1 and R^2 can be the same or different, and each is selected from the group consisting of hydrogen, C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, hydroxy, F, Cl, Br, and I; and X is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, alkaryl, aralkyl and optionally interrupted or terminated by N, O, P, S, heteroalkyl, heteroaryl, carbonyl, acyl, acyloxy, —CHO, —$COOR^1$, —$CO2C(R^1)_3$, —$CONC(R^1)_2$, cyano, alkyloxy, aryloxy, hydroxy, hydroxyalkyl, amino, alkylamino, dialkylamino, arylamino, diarylamino, — NR^1COR^2, thioalkyl, thioaryl,—SO_2R^1, —SOR^1, —SO_2OR^1, F, Cl, Br, and I; R^1 and R^2 can be the same or different, and each is selected from the group consisting of hydrogen, C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, hydroxy, F, Cl, Br, and I, and m = 0 - 3.

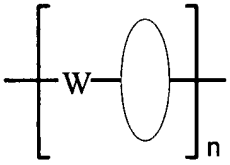
184. (New) The article of claim 183, wherein the structure comprises a 1-, 2- or 3-dimensional array of n monomer units.

185. (New) The article of claim 183, wherein R3 or R6 comprises the formula:



186. (New) The article of claim 183, wherein X comprises the formula:



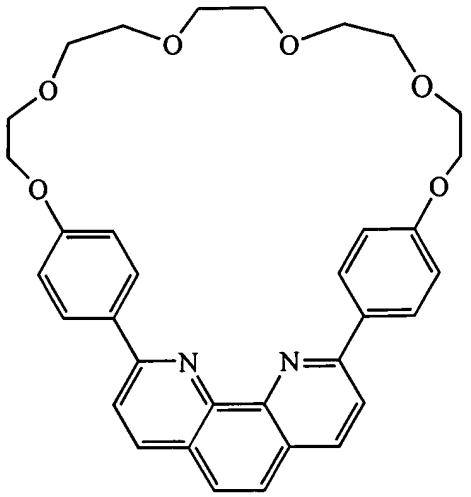
wherein ( ) comprises two continuous chains of atoms and 

comprises a species selected from the group consisting of a dielectric and a conductive nanoscopic pathway, and n is an integer greater than 0.

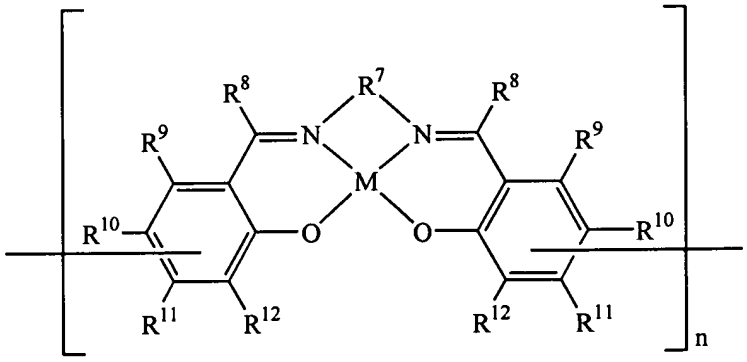
wherein the continuous chains of atoms comprises chains of methylene units optionally interrupted by an atom selected from the group consisting of oxygen, nitrogen, sulfur and phosphorus.

187. (New) The article of claim 186, wherein the continuous chains comprise chains of ethylene

188. (New) The article of claim 106, wherein X comprises the formula:



189. (New) The article of claim 106, wherein the conducting polymer has a structure comprising the formula:



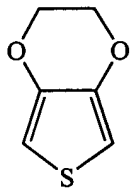
wherein M is a metal ion, n denotes a number of monomer units, n being at least 3, the polymeric structure comprising linkages through at least one atom in $R^7 - R^{12}$ units, and

$R^7 - R^{12}$ can be the same or different, and each is selected from the group consisting of hydrogen, C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, carbonyl, acyl, acyloxy, —CHO, —$COOR^1$, —$CO_2C(R^1)_3$, —$CONC(R^1)_2$, cyano, nitro, hydroxy, hydroxyalkyl, amino, alkylamino, dialkylamino, arylamino, diarylamino, — NR^1COR^2, thioalkyl, thioaryl,—SO_2R^1, —SOR^1, —SO_2OR^1, F, Cl, Br, and I, or where possible, any two R groups combining to form a ring structure;

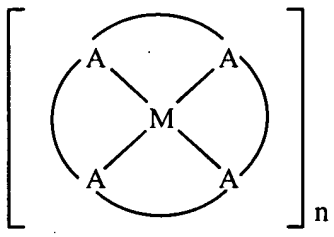
R^1 and R^2 can be the same or different, and each is selected from the group consisting of hydrogen, C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, hydroxy, F, Cl, Br, and I.

190. (New) The article of claim 189, wherein the structure comprises a 1-, 2- or 3-dimensional array of n monomer units.

191. (New) The article of claim 189, wherein R^{10} is:



192. (New) The article of claim 106, wherein the conducting polymer has a structure comprising the formula:



wherein M is a metal ion, n denotes a number of monomer units, n being at least 3, the polymeric structure comprising linkages through at least one atom in 

, and any 

unit or X is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, alkaryl, aralkyl and optionally interrupted or terminated by N, O, P, S, heteroalkyl, heteroaryl, carbonyl, acyl, acyloxy, —CHO, —$COOR^1$, —$CO_2C(R^1)_3$, —$CONC(R^1)_2$, cyano, nitro, alkyloxy, aryloxy, hydroxyl, hydroxyalkyl, amino, alkylamino, dialkylamino, arylamino, diarylamino, — NR^1COR^2, thioalkyl, thioaryl,—SO_2R^1, —SOR^1, —SO_2OR^1, F, Cl, Br, and I; R^1 and R^2 can be the same or different, and each is selected from the group consisting of hydrogen, C_1-C_{10} alkyl, C_1-C_{10} heteroalkyl, aryl, heteroaryl, hydroxy, F, Cl, Br, and I, and m = 0-2.

193. (New) The article of claim 192, wherein the structure comprises a 1-, 2- or 3- dimensional array of n monomer units.

194. (New) The article of claim 192, wherein the four 

units comprise a macrocycle.

195. (New) The article of claim 194, wherein the macrocycle is selected from the group consisting of cyclams, phthalocyanines and porphyrins.

196. (New) The article of claim 194, wherein the metal ion is a transition metal ion.